

REMARKS

This paper is responsive to the Office Action mailed November 28, 2005. Reconsideration and allowance of claims 1-33 are respectfully requested.

The Office Action

Claims 1, 12, and 18 stand rejected under 35 U.S.C. § 112.

Claims 1-4, 6, 7, 12, 16-18, 20, 21, and 30-33 stand rejected under 35 U.S.C. § 102 as being anticipated by Cummings (US 4,909,999).

Claims 5, 8-11, 19, 22-24, and 27-29 stand rejected under 35 U.S.C. § 103 as being unpatentable over Cummings in view of Childers (US 5,876,664).

Claims 8-11, 13-15, 22-24, and 27-29 stand rejected as being unpatentable over Cummings in view of Edwards (US 6,077,480).

Claims 25-26 stand rejected under 35 U.S.C. § 103 as being unpatentable over Cummings in view of Edwards, further in view of Raniwala (US 6,645,429).

The References of Record

Cummings is directed to a sterilization system. Air is fed through an air intake **30** to an air inlet **42** of a vaporizer chamber **28**. Hydrogen peroxide is injected by an injection valve **38** through a hydrogen peroxide inlet portal **42A** into the evaporation chamber **28** (Figure 6). Vaporized hydrogen peroxide entrained in the inlet air is discharged through an exit portal **44** disposed diametrically opposite to the air inlet portal **42**. Thus, the vaporization chamber **28** provides a straight, flow-through passage. The hydrogen peroxide vapor is conveyed to an instrument container **12**.

The vacuum motor **40** withdraws gas from the container **12** and pumps it to an inlet portal **46** of a destroyer chamber **26** (Figure 5). Chamber **26** includes a plurality of spheres **58** which function as catalysts to break down the hydrogen peroxide or ozone into harmless components that can be vented to the atmosphere. Once the hydrogen peroxide or ozone has been broken down, the gas is discharged through a portal **48**.

The vaporizer/converter **20** houses both the vaporizer **28** and the destroyer or catalytic converter **26** in a common housing. The vaporizer chamber **28** extends generally linearly down the center of the housing while the destroyer or catalytic converter chamber **26** extends in a general U-shape around it. A heater **84** surrounds the chamber to provide the heat for vaporizing the hydrogen peroxide and heat to accelerate the catalytic degradation of the spent hydrogen peroxide vapor.

Optionally, a parallel path **61** and a flow restrictor **65** permit some of the air from the intake **30** to bypass the vaporization chamber **28** (Figure 1). The air diverted along path **61** joins the air and vapor mixture exiting the vaporization chamber **28** and cools it. By adjusting the amount of air flowing through the bypass **61** relative to the amount of air flowing through the vaporizer, the temperature of the air/vapor mixture entering container **12** can be controlled. Thus, the bypass line of Cummings is a form of temperature control for controlling the temperature of the sterilant gas entering the chamber **12**.

The Present Application

The present application is concerned with treating, e.g., sterilizing large volumes, such as room or warehouse, e.g., a volume on the order of 1,000-4,000 cubic meters. To decontaminate the room or its contents, a relatively large volume of air is blown by a blower **16** through a duct **23**, such as the HVAC system associated with the room. A typical flow rate might be on the order of 20,000 liters per minute.

Pumping such a large volume of air through a vaporizer has significant problems, such as the logistical problems associated with a very large size vaporizer and large scale heaters for maintaining vaporization temperatures in such high volume air flows. Rather than circulating or passing the carrier gas flow through a vaporizer, highly concentrated vapor is injected into the passing carrier gas stream.

More specifically, a separate smaller carrier gas supply, such as compressed air, nitrogen, carbon dioxide, helium, argon, or the like, is fed at about 1-2 atmospheres absolute into a flash vaporizer **34** at a flow rate of 20 liters per minute or less, more preferably 1-10 liters per minute. This smaller gas flow in which a relatively high concentration of hydrogen peroxide primarily in vapor form is injected into the duct **23**. More specifically, the dispersion is injected with sufficient

velocity that it is impelled substantially across the duct and mixed into the much larger volume of flowing air. Swirling turbulence created by the injection may assist the uniform absorption of the hydrogen peroxide vapor into the carrier gas flow in the duct.

Thus, where the Cummings patent is directed to controlling the temperature of carrier gas and vapor entering a treatment chamber, the present application is concerned with efficiently generating sufficient quantities of vapor to treat very large volumes.

**The Claims Distinguish Patentably
Over the References of Record**

Claim 1 calls for a duct through which a first carrier gas passes to a defined region and for a compressed gas source of a compressed, second carrier gas different from the first. By distinction, the gas flow through bypass line **61** of Cummings is the self-same gas flow that flows through the vaporizer.

Claim 1 further calls for injecting the dispersion at a higher pressure than the pressure of the carrier gas in the duct to absorb the dispersion into the first carrier gas flowing through the duct. By contrast, the output of the vaporizer and the bypass line of Cummings merely mix together with no suggestion that either one be at a higher pressure than the other or that one be injected into the other. Accordingly, it is submitted that **claim 1 and claims 2, 3, 7-11 and 13-15 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 4 has been placed in independent form without further limitations. It calls for the flash vaporizer to include a metal block that has a passage extending through the block that expands from the inlet to the outlet and which turns at least 180° between the inlet and the outlet. By contrast, the vaporizer chamber **28** of Cummings has inlet and outlet ports **42, 44** which are in alignment with each other. There is no 180° bend in the flow path between the inlet and outlet. It should be noted that the U-shaped chamber **26** of Cummings is not a vaporizer chamber but rather the chamber of a catalytic converter which destroys or breaks down the exhausted peroxide vapor. Accordingly, it is submitted that **claim 4** is not anticipated by Cummings.

Claim 12 calls for injecting the dispersion into a turbulent mixing zone in the duct. Cummings does not suggest a turbulent mixing zone.

Further, claim 12 calls for the dispersion to have a higher pressure and velocity than the carrier gas in the duct. Cummings does not address such higher pressures or velocities or advantages thereof. Accordingly, it is submitted that **claim 12, and dependent claims 16-17 dependent therefrom** distinguish patentably over the references of record.

Claim 18 calls for the dispersion to have a lower flow rate and a higher velocity than the first carrier gas stream in the duct. Cummings fails to address such differences or the advantages thereof. Accordingly, it is submitted that **claim 18, and claims 19-20, 22, and 25-32 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 21 calls for the second carrier gas to be from a different source than the first carrier gas. By contrast, a single source of gas is split by Cummings between the vaporizer and the bypass line. Accordingly, it is submitted that **claim 21 and claims 23-34 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 33 calls for compressing a second carrier gas. Cummings provides a flow of only one carrier gas which is subsequently split. No compressors are provided after the gas is split.

Claim 33 further calls for injecting the dispersion into a mixing zone with a sufficiently high velocity to cause turbulent mixing. Cummings does not address turbulent mixing or the advantages thereof. Accordingly, it is submitted that **claim 33** distinguishes patentably and unobviously over the references of record.

35 U.S.C. § 112

Claims 1, 12 and 18 have been carefully amended to address the issues raised by the Examiner. It is submitted that these claims are now in condition for allowance.

Telephone Interview

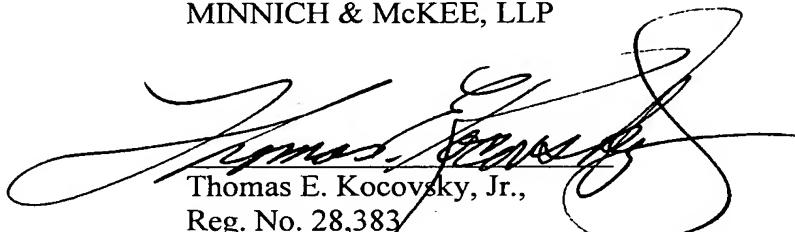
In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone the undersigned at (216) 861-5582.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-33 distinguish patentably and unobviously over the references of record and meet the other statutory requirements. An early allowance of all claims is requested.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP



Thomas E. Kocovsky, Jr.,
Reg. No. 28,383
Ann M. Skerry
Reg. No. 45,655
1100 Superior Avenue
Seventh Floor
Cleveland, OH 44114-2579
(216) 861-5582